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(71) Applicant
Sony Corporation (Japan),
6–7–35 Kitashinagawa, Shinagawa-ku, Tokyo 141,
Japan

(72) Inventors
Takao Mogi
Yoshinori Komiya
Masayuki Suematsu

(74) Agent and/or Address for Service
D. Young & Co,
10 Staple Inn, London WC1V 7RD

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(54) Electric or electronic apparatus comprising a memory

(57) An electric or electronic apparatus 1 includes a non-volatile memory 21 and terminals 22 for allowing various kinds of information peculiar to the apparatus 1 to be writable therein and readable therefrom through external computers as 23c installed at a factory, wholesalers, retailers, and repair service stores. The external computers 23 are connectable to a host computer 25 installed in a centralised management section.

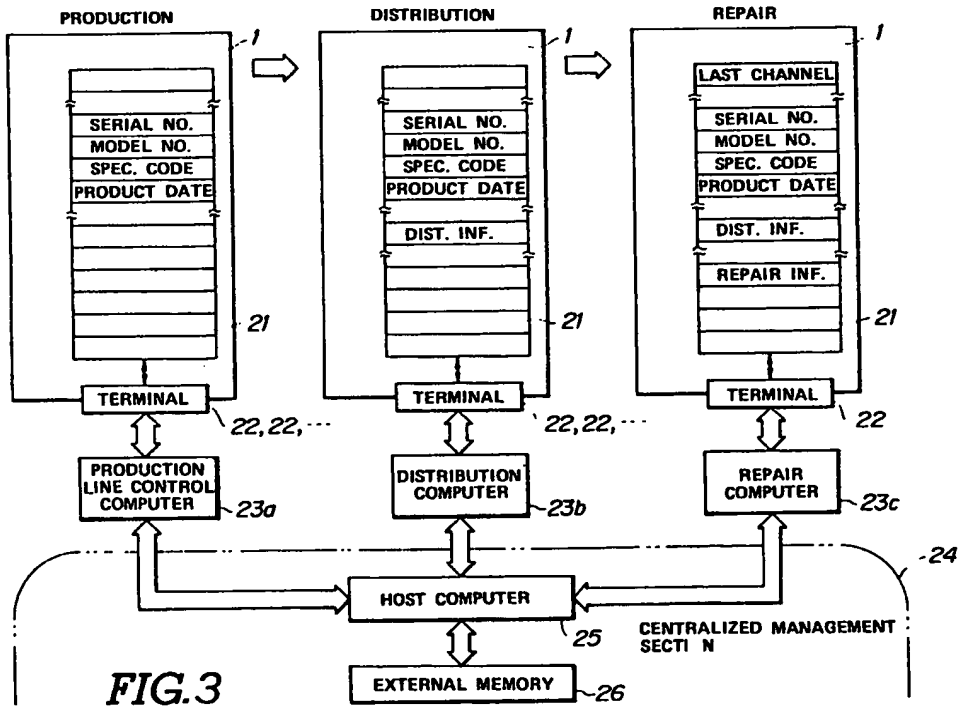

FIG.3

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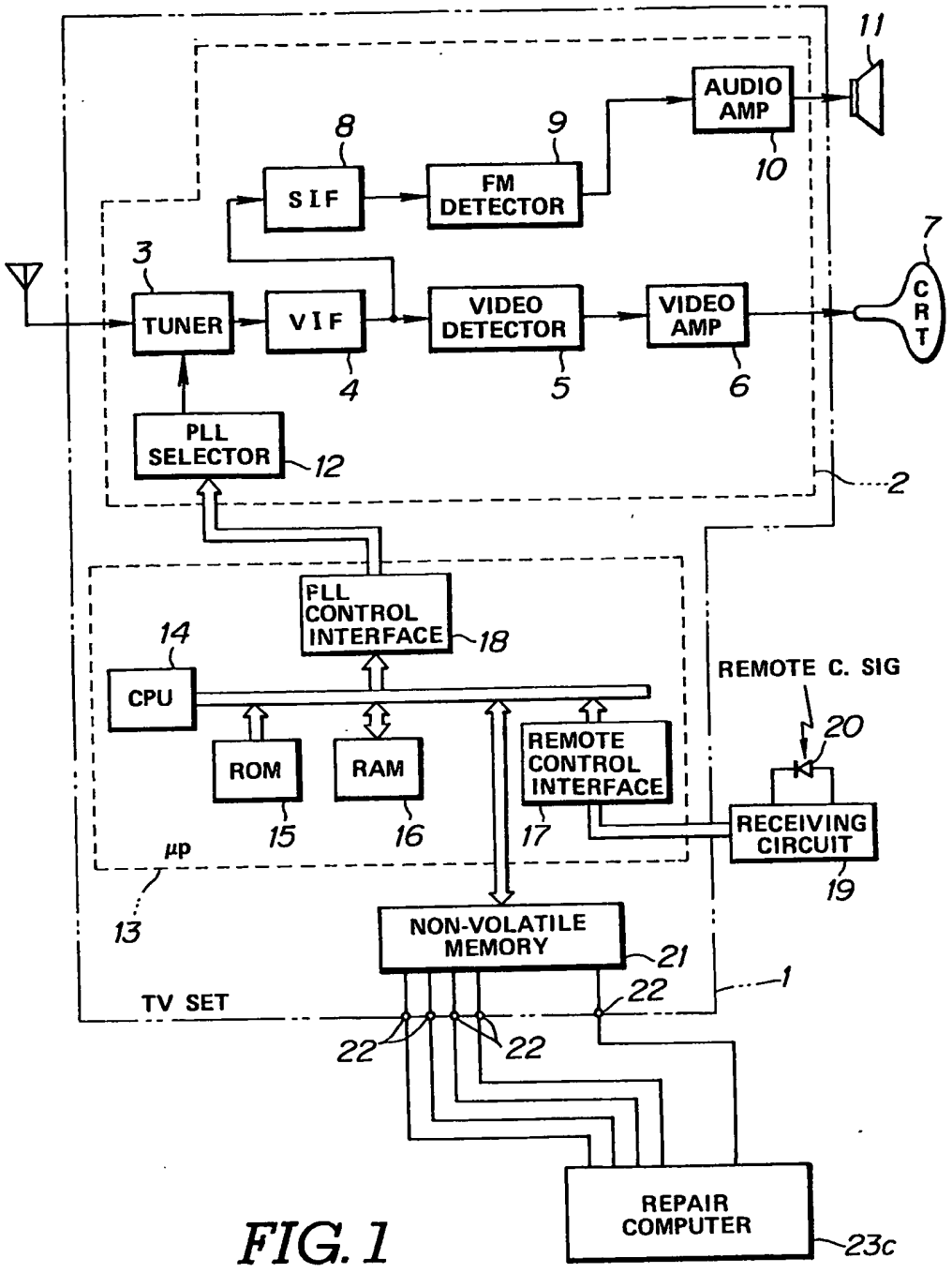

FIG. 1

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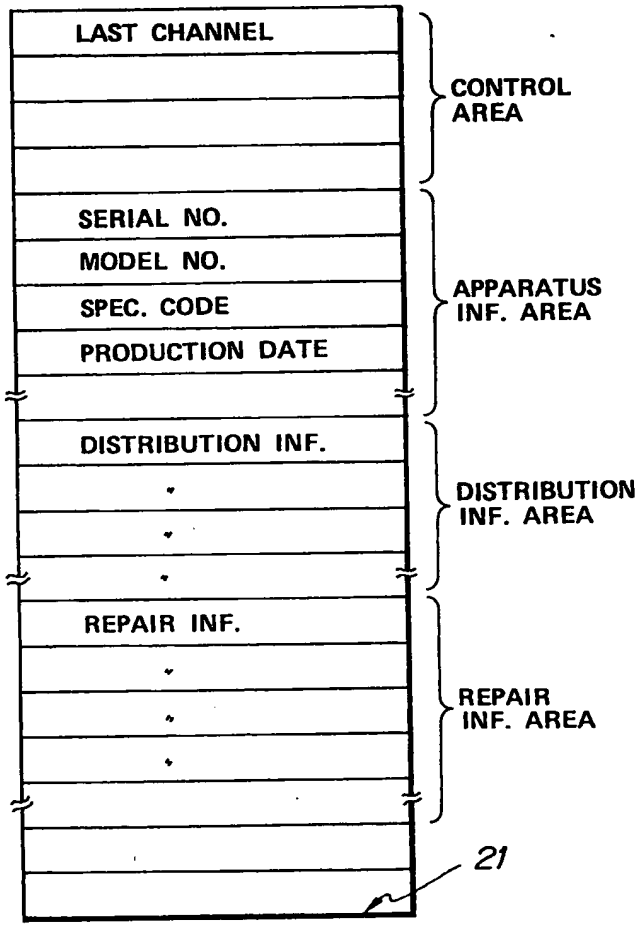

MEMORY MAP

FIG.2

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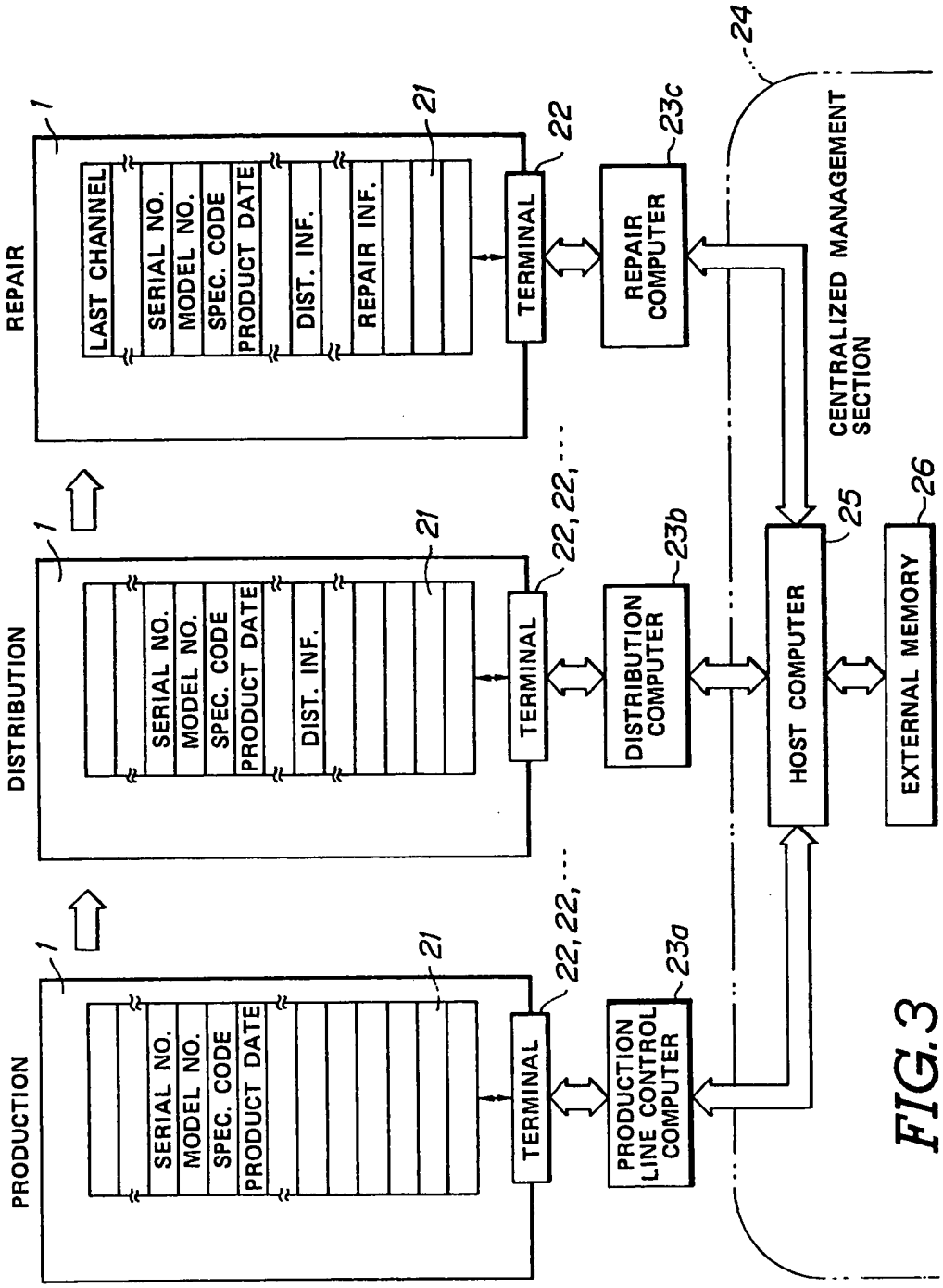

FIG. 3

SPECIFICATION

Electric or lectronic apparatus comprising a memory

This invention relates to electric or electonic apparatus comprising a memory, and to associated methods.

Household electronic apparatus, such as television sets and video tape recorders, or office automation apparatus, such as word processors, duplicators, facsimile machines, or office computers, are shipped from a factory marked with an individual product number or individual series number. Each individual apparatus is distinguishable on the basis of the marked number when repair or maintenance is required.

When a repair or maintenance has been performed on an apparatus, the description of the repair or maintenance is commonly entered into a repair service management card having a serial number corresponding to the apparatus. These management cards are kept by a service management company or by the manufacturer as useful data for subsequent repair or maintenance.

However, it has been difficult for the manufacturer to collect information on all repair or maintenance performed on all the products. This would form useful data, which would be analysed statistically and used, for example, for improvement of product quality. On the other hand, a manufacturer may wish to make a sales plan in accordance with a distribution situation, by analysing various kinds of distribution information obtained on the basis of distribution routes, destinations of goods, and so forth.

Therefore, there is a need for the manufacturer consistently to collect and analyse various kinds of information or data as to the manufacture, sales, repair or maintenance of each individual apparatus. Moreover, it is preferable for repair persons to have the information peculiar to each apparatus, such as the model number, specifications, and manufacturing data, in addition to the serial number, in order to make adequate and quick repairs or to effect maintenance.

In the conventional management system dependent mainly upon cards as described above, it has been impossible to satisfy the above-mentioned various diversified demands.

According to the present invention there is provided an electric or electronic apparatus which comprises:
a non-volatile memory for storing various data peculiar to the electronic apparatus; and
t rminals for conn cting said memory to at least one computer external to the apparatus to allow said various data t be writable in and readable from said memory through the external c mputer.

According to the present invention th re is also pr vided a method of providing accessible information relevant t an electric or electronic apparatus, c mprising the st ps of:
providing a non-volatile memory with said apparatus, a portion of said memory being directed to storing data relevant to at least one of the characteristics of production, distribution, and repair;
providing terminals on said apparatus for accessing said memory and connecting said memory to at least one external computer for writing various data concerning said production, distribution, or repair into and reading such data from said memory through the external computer.

According to the present invention there is also provided in combination:
an apparatus;
a non-volatile memory secured to said apparatus, said memory having production information area means for storing production data, distribution area means for storing distribution information, and repair information area means for storing repair information, each of said production, distribution and repair area means being accessed through terminals on said apparatus for selective connection to a production line control computer means, a distribution computer means, and a repair computer means, each of which is connected to a host computer at a centralised management location.

The various information or data may be simultaneously stored in a host computer installed in a centralised management section of the manufacturer through the external computer, when stored in the non-volatile memory. The various information or data may be apparatus information including a serial number, a model number, a specification code and so forth; wholesaler and retailer distribution information including a name, a purchase data, a sales date, a purchase price, a selling price, a destination, and the like, and repair/maintenance information, parts repair, and adjustments, by way of example.

The external computers may be production line computers installed in a factory, wholesaler distribution computers, retailer distribution computers, and repair service computers all connected to the host computer and accessible to each non-volatile memory unit incorporated in each electronic apparatus. Therefore, various data or information can simultaneously be read or written to both the apparatus and the host computer through the external computers.

In the case of embodiments of electronic apparatus according to the pr sent inv ntion, in the distribution stag th wholesalers and retailers can r ad various kinds of necessary information peculiar to the electronic apparatus from the non-volatile memory or a host computer install d at a centralised management secti n of th manufacturer, and writ various

kinds of distribution information (for example wholesaler name, retailer nam , and sales price) to the host computer while writing the distribution information in vacant areas of the non-volatile memory.

Moreover, at the repair or maintenance stage, the repair person can effect an appropriate repair by reading the information peculiar to the electronic apparatus from the non-volatile memory through a repair computer. Furthermore, the repair person can send the contents of the repair service, together with the information peculiar to the electronic apparatus, to the host computer in order to record the contents of the repair in the centralised management section as data. Therefore, the repair person can take appropriate repair or maintenance action while knowing the previous history of the repair service.

In the centralised management section, the data as to production, distribution and repair, are all collected as consistent useful information, and used for control or to manage each electronic apparatus consistently and systematically, or for assistance in making a production or sales plan.

The invention will now be described by way of example with reference to the accompanying drawings, throughout which like parts are referred to by like references, and in which:

Figure 1 is a block diagram of an embodiment of electronic apparatus according to the present invention;

Figure 2 is an illustration showing a memory map of a non-volatile memory incorporated in the electronic apparatus of Fig. 1; and

Figure 3 is an illustration showing an example of control or management systems for embodiments of electronic apparatus according to the present invention.

Fig. 1 is a block diagram showing an embodiment of the present invention, in which the electronic apparatus is, by way of a preferred example, a television set 1, including an image receiving circuit 2. The image receiving circuit 2 is made up of a television tuner 3, a video interface (VHF) 4, an image circuit section having a video detector 5 and a video amplifier 6 to reproduce an image on a cathode ray tube (CRT) 7, a sound interface (SIF) 8, and an audio circuit section having an FM detector 9 and an audio amplifier 10 to reproduce sound through a loudspeaker 11. The television tuner 3 is controlled by a phase locked loop (PLL) station selector 12 to select a desired station.

A minicomputer 13 controls the image circuit s ction, and includes a central processing unit (CPU) 14, a read only memory (ROM) 15, a random acc ss memory (RAM) 16, a r mote control interfac 17, and a PLL control intefac 18. A receiving circuit 19 receives an infrared remote control signal through a photodiode 20 and transmits the received remot control signal to the remote control interface 17. Th remote control signal supplied to the microcomputer 13 through the remote control interface 17 is processed by the CPU 14 to control the image receiving circuit 2 in accordance with the remote control signal. The remote control interface 17 transmits a station selecting signal to the PLL station selecting circuit 12 to tune the image receiving circuit 2 to a channel corresponding to the station selection signal.

A non-volatile memory 21 is connected to a system bus of the microcomputer 13. Although a part of the area of the memory 21 is used as an apparatus control area for controlling the image receiving circuit 2, the remaining area is used for information peculiar to the television set 1, that is, to store production information, distribution information, repair service information, and other information of potential interest. Moreover, the non-volatile memory 21 is connected to a plurality of external terminals 22 of the television set 1, so that data can be written or read externally through the external terminals 22 when an external computer is connected to the external terminals 22. Furthermore, in order to allow the data to be read even when the power supply circuit of the television set 1 itself is interrupted, the apparatus is so designed that a supply voltage can be supplied thereto from the outside.

Fig. 2 shows a memory map of the non-volatile memory 21 included in the television set 1 of Fig. 1. The apparatus control area of the non-volatile memory 21 is used as the last channel memory, for instance. The last channel memory thus always stores the presently-tuned channel. Therefore, when the channel is switched in response to a remote control signal, the memory channel is also switched according to this signal. Moreover, even if the power supply of the television set 1 is off, the contents of the stored channel are not erased. Thereafter, when the power supply is turned on, a channel stored in the non-volatile memory 21 is read to tune the tuner 3 to the last channel.

Data stored in memory in shipment

In the apparatus information area of the non-volatile memory 21, information or data peculiar to the television set 1, such as the serial number, a model number, a specification code, a production date, and so forth, are written in the memory 21 through a production line control computer 23a (see Fig. 3) installed at the last production process at the factory. The production line control computer 23a is connected to a host computer 25 installed in a centralised manag ment section 24 of the manufacturer as shown in Fig. 3. Therefore, the abov information written in the non-volatile memory 21 through the computer 23a is also stored in th host computer 25 or in an appropriate xternal memory 26 through

the host computer 25.

Data stored in memory in distribution

In the distribution information area of the non-volatile memory 21 of the television set 1, various kinds of information at the distribution stage are written through a distribution computer 23b. That is, distribution computers 25b connected to the host computer 25 are installed at each first wholesaler, each second wholesaler, and each retailer of the electronic apparatus. Such distribution computers are thus installed at each step of the distribution chain. Various kinds of information (for example, the store name, the purchase date, the sales data, the purchase price, the selling price, and the destination) are all written in a previously determined area in the non-volatile memory 21 of the television set 1 by each wholesaler or each retailer who handles the television set 1.

Therefore, all of the predetermined pertinent distribution information or data are written in the non-volatile memory 21 until the television set 1 is delivered to the user. Additionally, the distribution information is sent to the host computer 25 through the distribution computer 23b, and then stored in the external memory 26. Therefore, the transmitted distribution information is analysed in various ways and is available as data in developing a subsequent sales plan, the development or design plan of new products, and so forth.

Moreover, when the information is transmitted from the distribution computer 23b to the host computer 25 or processed by the host computer 25 or stored in the external memory 26, the serial number is used as a number which can specify and respectively distinguish each television set 1. In other words, the serial number serves as an identification number and unique signature for the apparatus throughout the system.

Data stored in memory in repair service

In the repair information area of the non-volatile memory 21 of the television set 1, data representative of the contents of repair are written through a repair computer 23c shown in Fig. 3 whenever repair or maintenance service is performed. That is to say, a repair computer 23c is installed at each repair service store for repairing the television set 1. In service, the repair person effects the repair service on the basis of whether or not any other repair has ever been performed on the television set 1 (for xample, the replacement of the CRT, int grated circuits (ICs) r the repair of some switch s, or adjustments in additi n to the apparatus information. In the event that th r pair has previously be n perform d, the repair person can effect the repair on th basis of the model number, th sp cification, and the characteristics of the previous repair by reading the stored information. Moreover, when the repair has been completed, th contents of the current repair are also written in the repair information area. The contents of the repair are then transmitted to the host computer 25 installed in the centralised management section 24, and stored in the external memory 26 through the host computer 25. The data as to the contents of the repair are used for production quality control, design modifications, and like purposes.

The operation of the embodiments of electronic apparatus will now be described.

As described above, in the television set 1, since the non-volatile memory 21 is provided so as to read and write data through the external terminals 22, the television set 1 can be shipped from the factory after the apparatus information, including the serial number as an identification number, has been stored in a part of the memory 21 of the television set 1. Thereafter, the distribution information and the repair information are written in the distribution information area and the repair information area of the non-volatile memory 21 in the distribution stage and the repair stage, respectively. Therefore, it is possible to know all the necessary apparatus information, distribution information and repair information relating to the television set 1 by reading the contents of the non-volatile memory 21. Therefore, it is possible to take action for the television set 1 on the basis of the known information. Moreover, when the apparatus information, the distribution information and the repair information are written in the non-volatile memory 21, if the written information is simultaneously transmitted to the host computer 25 installed in the centralised management section 24, it is possible to obtain all kinds of information pertinent to all the television sets 1 in the centralised management section 24, consistently to control the overall management of the electronic product.

The above embodiment has been described for the case where the present invention is applied to a television set. However, the present invention is generally applicable to any electric or electronic apparatus. In particular, since office automation apparatus such as word processors should be frequently modified for version updating, the repair and maintenance information may be complicated and very variable. Therefore, it is important to manage consistently all the products at a centralised management section.

The electronic apparatus to which the present invention is applicable includes all apparatus in which an l ctronic circuit is incorporat d. For instanc , an automotive v hicle including an lectronic circuit with a comput r for controlling an engin , is an lectronic apparatus of the present sp cification to which the present invention can also be appli d.

As described above, the electronic appara-

tus is provided with a non-volatile memory for storing various data relating to the apparatus, and terminals for selectively connecting the non-volatile memory to a production line control computer, a distribution computer, or a repair computer in such a way that various data are readable from and writable in the non-volatile memory through the terminals from the outside. Moreover, these data are all stored in a host computer installed in the centralised management section of the manufacturer.

Therefore, in the distribution stage, the wholesaler or the retailer can read the information peculiar to the electronic apparatus from the non-volatile memory and simultaneously write the distribution information (for example, wholesaler name, retailer name, selling price, etc) in a vacant area of the non-volatile memory through the distribution computer, while transmitting the data to the host computer installed at the centralised management section.

Moreover, a repair person can perform the after-sale service by reading the information peculiar to the electronic apparatus from the non-volatile memory through the repair computer for repair or maintenance. Furthermore, it is possible to record the contents of the maintenance service as data in the host computer installed in the centralised management section by transmitting the contents of the repair together with the information peculiar to the electronic apparatus to the host computer. Therefore, it is possible to perform appropriate repair or maintenance on the basis of the contents of the preceding repair or maintenance.

Furthermore, it is possible consistently to manage the electronic apparatus at the centralised management section by collecting the production data, distribution information and the repair information.

CLAIMS

1. An electric or electronic apparatus which comprises:
a non-volatile memory for storing various data peculiar to the electronic apparatus; and
terminals for connecting said memory to at least one computer external to the apparatus to allow said various data to be writable in and readable from said memory through the external computer.

2. Apparatus according to claim 1 wherein the various data are simultaneously stored in a host computer installed in a centralised management section through the external computer when stored in said memory by the same external computer.

3. Apparatus according to claim 2 wherein the various data writable in and readable from said memory are apparatus information including at least one of a serial number, a model number, a specification code, and a production date, and the external computer is a production line computer installed at a factory location, said apparatus information being written in said memory and transmitted to the host computer through a production line computer.

4. Apparatus according to claim 2 wherein the various data writable in and readable from said memory are wholesaler distribution information including at least one of a wholesaler name, a purchase date, a sales date, a purchase price, a selling price and a destination, and the external computer is a wholesaler distribution computer installed at a wholesaler location, the above distribution information being written in said memory and transmitted to the host computer through the wholesaler distribution computer.

5. Apparatus according to claim 2 wherein the various data writable in and readable from said memory are the retailer distribution information including at least one of a retailer name, a purchase date, a sales date, a purchase price, a selling price and a destination, and the external computer is a retailer distribution computer installed at a retailer location, the above distribution information being written in said memory and transmitted to the host computer through the retailer distribution computer.

6. Apparatus according to claim 2 wherein the various data writable in and readable from said memory and repair/maintenance service information including at least one of parts replacements, parts repair, and adjustments, and the external computer is a repair computer installed at a repair service store location, the above repair/maintenance service information being written in said memory and transmitted to the host computer through the repair computer.

7. Apparatus according to claim 3 wherein the apparatus information written in both said memory and in the host computer through the production line computer is readable by a wholesaler distribution computer installed at a wholesaler location, a retailer distribution computer installed at a retailer location and a repair computer installed in a repair service store location.

8. Apparatus according to claim 4 wherein the wholesaler distribution information written in both said memory and in the host computer through the wholesaler distribution computer is readable by a production line computer installed at a factory location, a wholesaler distribution computer installed in a wholesaler location, a retailer distribution computer installed at a retailer location, and a repair computer installed in a repair service store location.

9. Apparatus according to claim 5 wherein the retailer distribution information written in both said memory and in the host computer through the retailer distribution computer is readable by a production line computer in-

stalled at a factory location, a wholesaler distribution computer installed at a wholesaler location, a retailer distribution comput r installed at a retailer location, and a repair computer installed at a repair service store location.

10. Apparatus according to claim 6 wherein the repair/maintenance service information written in both said memory and in the host computer through the repair computer is readable by a production line computer installed at a factory location, a wholesaler distribution computer installed at a wholesaler location, a retailer distribution computer installed in a retailer location, and a repair computer installed at a repair service store location.

11. A method of providing accessible information relevant to an electric or electronic apparatus, comprising the steps of:
providing a non-volatile memory with said apparatus, a portion of said memory being directed to storing data relevant to at least one of the characteristics of production, distribution, and repair;
providing terminals on said apparatus for accessing said memory and connecting said memory to at least one external computer for writing various data concerning said production, distribution, or repair into and reading such data from said memory through the external computer.

12. A method according to claim 11 wherein the step of storing the various data is simultaneously accompanied by a step of storing such various data in a host computer located at a centralised management section through said external computer, said storing step being simultaneously carried out at the time said external computer stores said various data in said memory.

13. A method according to claim 12 wherein the steps of writing and reading said various data include the steps of writing and reading at least one of the following: apparatus information including a serial number, a model number, a specification code, and a production code; and wherein said external computer is a production line computer installed in a factory, the method further comprising the steps of:
writing said apparatus information in said memory;
transmitting said apparatus information to the host computer through the production line computer.

14. A method according to claim 12 wherein the various data written into and read from said memory are wholesaler distribution information including at least one of th following: a whol sal r name, a purchase price, a sales date, a purchase date, a selling price, and a destination; and wherein said external computer is a wholesaler distribution computer install d at a wholesaler location, further comprising the steps of:
writing the wholesaler distribution information in said memory; and transmitting said wholesaler distribution information to th host computer through the wholesaler distribution computer.

15. A method according to claim 12 wherein data written into and read from said memory are retail distribution information including at least one of the following:
a retailer name, a purchase date, a sales date, a purchase price, a selling price, and a destination; and the external computer is a retailer distribution computer installed at a retailer location, further comprising the steps of:
writing the retailer distribution information into said memory; and transmitting said retailer distribution information to the host computer through the retailer distribution computer.

16. A method according to claim 12 wherein the various data written into and read from said memory are repair/maintenance service information including at least one of the following: parts replacement, parts repaired, and adjustments, and wherein the external computer is a repair computer installed at a repair service location, further comprising the steps of:
writing said repair/maintenance service information into said memory; and transmitting said repair/maintenance service information to the host computer through the repair computer.

17. A method according to claim 13 further including the steps of reading said apparatus information written in said memory and in the host computer through the production line computer by any one of a wholesaler distribution computer installed at a wholesaler location, a retailer distribution computer installed at a retailer location, and a repair computer installed at a repair service store location.

18. A method according to claim 14 further including the steps of reading the wholesaler distribution information written in said memory and in the host computer through the wholesaler distribution computer by any one of a production line computer installed at a factory, a wholesaler distribution computer installed at a wholesaler location, a retailer distribution computer installed at a retailer location, and a repair computer installed at a repair service store location.

19. A method according to claim 15 further including the step of reading the retailer distribution information written in said memory and in the host computer through the retailer distribution computer by any one of a production line computer installed at a factory, a wholesal r distributi n computer installed at a wholesal r location, a retailer distribution computer installed at a retailer location, and a repair computer install d at a repair service store location.

20. A method according to claim 16 further including the step of reading the repair/-maintenance service information writt n in said

memory and in the host computer through the r pair computer by any one of a production line computer installed at a factory location, a wholesaler location, a retailer distribution computer installed at a retailer location, and a repair computer installed at a repair service store location.

21. In combination:
an apparatus;
a non-volatile memory secured to said apparatus, said memory having production information area means for storing production data, distribution area means for storing distribution information, and repair information area means for storing repair information, each of said production, distribution and repair area means being accessed through terminals on said apparatus for selective connection to a production line control computer means, a distribution computer means, and a repair computer means, each of which is connected to a host computer at a centralised management location.

22. A combination according to claim 21 further including an external memory selectively connected to said host computer for exchanging information therewith.

23. An electric or electronic apparatus substantially as hereinbefore described with reference to the accompanying drawings.

24. A method according to claim 11 and sugbstantially as hereinbefore described with reference to the accompanying drawings.

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